REMARKS

Reconsideration of the subject application is earnestly solicited.

Claims 61 through 115 are pending, with Claims 61, 62, 63, 70, 73, 79, 80, 81, 88, 91, 98, 99, 100, 107, and 110 being independent. Claims 79 through 97 were allowed. Claims 98 through 115 were withdrawn from consideration.

STATEMENT UNDER 37 C.F.R. § 41.202

As previously noted, Applicant respectfully submits that the claims have been copied in modified form from Claims 1 through 4 and 6 through 13 of U.S. Patent No. 5,883,732 (Takada, et al.), as shown by the following Table:

TABLE

Takada, et al. claims	subject application claims
1	61, 79, 97/79, 98
2	62, 80, 97/80, 99
3/1	63, 81, 97/81, 100
3/2	73, 91, 97/91, 110
4/3/1	64, 82, 97/82, 101
4/3/2	74, 92, 97/92, 111
5/4/3/1	
5/4/3/2	
6/5/4/3/1	65, 83, 97/83, 102
6/5/4/3/2	75, 93, 97/93, 112
7/6/5/4/3/1	66, 84, 97/84, 103

Takada, et al. claims	subject application claims
7/6/5/4/3/2	76, 94, 97/94, 113
8/6/5/4/3/1	67, 85, 97/85, 104
8/6/5/4/3/2	77, 95, 97/95, 114
9/8/6/5/4/3/1	68, 86, 97/86, 105
9/8/6/5/4/3/2	78, 96, 97/96, 115
10	69, 87, 97/87, 106
11	70, 88, 97/88, 107
12	71, 89, 97/89, 108
13	72, 90, 97/90, 109

RESPONSE TO 35 U.S.C. § 112, 2nd PARAGRAPH, REJECTION

Claims 61 through 78 were rejected under 35 U.S.C. § 112, 2nd paragraph, as being indefinite. The Official Action asserts that the expression "wherein the curvatures in the main and sub-scanning directions are non-symmetrical with respect to each other with respect to the optical axis" is not clear because the curvature in the main scanning direction lies on a first plane containing the optical axis and the curvature in the sub-scanning direction lies on a second plane containing the optical axis, perpendicular to the first plane: the Official Action asks "how can they are non-symmetrical with respect to each other respect to the optical axis". All rejections and assertions are respectfully traversed.

Applicant respectfully submits that there is no indefiniteness because the artisan would have understood the objected-to expression to refer to the curvature in the main scanning direction and the curvature in the sub-scanning direction being *different from one*

another, i.e., a form of rotational asymmetry. In support of this argument, Applicant wishes to make the following points:

(1) Applicant has attached hereto a document entitled "The Four Types of Symmetry In the Plane" from "Math Forum: Types of Symmetry in the Plane" (http://mathforum.org/sum95/suzanne/symsusan.html). This document explains that there are four types of symmetry: rotation, translation, reflection, and glide reflection. Applicant wishes to direct the Examiner's attention to, for example, the "Rotation" figure on page 1. Assuming that the optical axis corresponds to the center of the figure, and the vertical line and the horizontal line correspond to the main and sub-scanning directions, respectively, it can be seen from the figure that rotational symmetry exists; in other words, contrary to the assertion in the Official Action, shapes on lines which are perpendicular to each other can exhibit rotational symmetry, with respect to each other with respect to the optical axis. Depicting the foregoing graphically, Applicant has attached hereto as Sketch A, a figure showing how rotational symmetry applies to the structure defined in Claim 61 (for purposes of explanation, symmetry is depicted, although Claim 61 refers to non-symmetry).

(2) Furthermore, Applicant wishes to emphasize that the claim recites "with respect to the optical axis", which expression would lead the artisan to think of rotational asymmetry. In this regard, Applicant

wishes to direct the Examiner's attention to U.S. Patent No. 4,302,830. At col. 8, lines 32 through 35, it is stated that two leaf springs 33, 34, are "symmetrically arranged with respect to the optical axis of the objective lens 5" and the "one or two leaf springs 42, 42' for focusing the objective lens 5 are also symmetrically arranged with respect to a plane..." (emphasis added). Applicant submits that this patent reflects the understanding of the artisan that the first expression "with respect to the optical axis" — which is present in Claim 61 — is used when referring to rotational symmetry or asymmetry, whereas the second expression "with respect to a plane" is used when referring to reflection symmetry or asymmetry. Applicant has attached hereto as Sketch B, a figure showing reflection symmetry, which does *not* reflect the meaning of Claim 61.

In view of the foregoing, Applicant respectfully submits the artisan would have understood the objected-to expression to refer to the curvature in the main scanning direction and the curvature in the sub-scanning direction being *different from one another*. Accordingly, reconsideration and withdrawal of the 35 U.S.C. § 112, 2nd paragraph, rejection is earnestly solicited.

COMMENT REGARDING CLAIMS 79 THROUGH 97

Claims 79 through 97 remain allowed; however, the Official Action indicates that those claims are patentably distinct from those of U.S. Patent No. 5,883,732 (Takada, et al.). In particular, the Official Action states that:

(a) the feature "wherein the curvatures in the main and sub-scanning directions are non-symmetrical with respect to the optical axis" in Takada, et al.'s claims means that "**the curvature in the main scanning direction on one side of the optical axis is not the same as that on the other side of the optical axis, and the curvature in the sub-scanning direction on one side of the optical axis is not the same as that on the other side of the optical axis**" (Official Action, p. 5, lines 12-18);

(b) whereas Claims 79 through 97 merely recite that each of the surfaces is non-symmetrical with respect to the optical axis (Official Action, p. 4).

At page 5, the Official Action states that the subject application's embodiments satisfy Takada, et al.'s non-symmetry only in the sub-scanning direction, but not in the main scanning direction. Applicants respectfully traverse the Official Action's position.

In this regard, Applicant does not agree that the expression "wherein the curvatures in the main and sub-scanning directions are non-symmetrical with respect to the optical axis" in Takada, et al.'s claims means that "the curvature in the main scanning direction on one side of the optical axis is not the same as that on the other side of the optical axis, and the curvature in the sub-scanning direction on one side of the optical axis is not the same as that on the other side of the optical axis".

Instead, Applicant respectfully submits that Takada, et al.'s expression "wherein the curvatures in the main and sub-scanning directions are non-symmetrical with respect to the optical axis" would have been understood by the artisan to refer to the same form

of rotational asymmetry recited in Claim 61, namely that the curvature in the main scanning direction is *not equal to* the curvature in the sub-scanning direction.

In support of the foregoing, Applicant submits that the claim language itself ("with respect to the optical axis") — taken without reference to Takada, et al.'s disclosure — suggests that the aforementioned form of rotational asymmetry is intended. In this regard, Applicant respectfully directs the Examiner to points (1) and (2) above, as well as to paragraphs 4-10 of Dr. Moore's 2nd Declaration filed July 26, 2005. (While the Official Action contends at page 6 that the Declaration should not be given much weight because it refers, *inter alia*, to plane symmetry, Applicant respectfully submits that the Declaration should, in fact, be given full weight, because it speaks not only about "plane symmetry" but also directly about how the Takada, et al. claim language should be construed.)

And if Takada, et al.'s disclosure is taken into account (see MPEP 2301.03), Applicant submits that it is even more clear that the aforementioned form of rotational asymmetry is claimed by Takada, et al. In this regard, Applicant again wishes to make the following points and respectfully requests that the Official Action expressly address these points:

(3) Takada, et al.'s specification itself suggests that the claim language was intended to refer to rotational asymmetry: it states that "even with lens surfaces that vary continuously in the curvature in the sub-scanning direction, the curvatures in the main and sub-scanning directions will depend on each other if the surfaces are aspheric and symmetric with respect to the optical axis and, therefore, one cannot hold the optical magnification in the sub-scanning direction constant without a

sufficient number of the degrees of freedom to achieve simultaneous correction of aberrations in both the main and sub-scanning directions" (col. 5, lines 55-64; emphasis added). Here, Takada, et al. was criticizing surfaces which are "symmetric with respect to the optical axis", i.e., where the curvature in the main scanning direction is equal to the curvature in the sub-scanning direction. See 2nd Declaration, paragraphs 11-12.

(4) Applicant respectfully submits that the position taken in Takada, et al.'s specification is echoed in its prosecution history. The October 5, 1998 Amendment in Takada, et al., a copy of which was attached to the August 18, 2003 Request for Reconsideration in the subject application as Tab 1, stated:

> In other words, the aspherical surface [of Yamakawa] is defined only by the distance from the optical axis no matter which direction it is. Accordingly, the aspherical surface thus defined is symmetrical around the optical axis. Namely, in Yamakawa, the curvatures in the main and sub-scanning directions must depend on each other since the curvatures are symmetrical around the optical axis.

In amended claim 1, as discussed above, the curvature in the sub-scanning direction can be determined independently from the curvature in the main scanning direction since the surface is not symmetrical around the optical axis.

Amendment, p. 4, lines 17-27 (double underline emphasis added). Here again, Applicant respectfully submits, "not symmetrical around the optical axis" was being used by Takada, et al. to refer to rotational asymmetry.

(5) And yet again, and most importantly, Applicant also respectfully wishes to point out that none of Takada, et al.'s embodiments comport with the Official Action's construction ("the curvature in the main scanning direction on one side of the optical axis is not the same as that on the other side of the optical axis, and the curvature in the sub-scanning direction on one side of the optical axis is not the same as that on the other side of the optical axis"). In more detail, in Takada, et al.'s embodiments, the imaging lens has aspheric surfaces in a cross-section taken in the main scanning direction expressed by the z_i equation below, while the curvature of the imaging lens in the sub-scanning direction varies continuously along the main scanning direction over the effective area of the imaging lens and the curvature is expressed by the U_i equation below:

$$z_\imath = \frac{y^2 / r_{\imath y}}{1 + \sqrt{1 - (K_\imath + 1)(y / r_{\imath y})^2}} + A_\imath y^4 + B_\imath y^6 + C_\imath y^8 + D_\imath y^{10}$$

$$U_\imath = U_{\imath x} + A_{\imath x} y^2 + B_{\imath x} y^4 + C_{\imath x} y^6 + D_{\imath x} y^8 + E_{\imath x} y^{10}$$

(col. 9, lines 18-42).

From these equations and the numerical tables in <u>Takada, et al.</u>, it can be seen that the imaging lens surfaces are rotationally asymmetric with respect to the optical axis — the radius of curvature in the plane containing the optical axis and the main scanning direction is not equal to the radius of curvature in the plane containing the optical axis and the sub-scanning direction. However, neither the embodiments nor the remainder of <u>Takada, et al.</u> teaches "the curvature in the main scanning direction on one side of the optical axis is not the same as that on the other side of the optical axis, and the curvature in the sub-scanning direction on one side of the optical axis is not the same as that on the other side of the optical axis". See 2nd Declaration, paragraphs 13-20.

In view of the foregoing, Applicant respectfully submits that the <u>Takada, et al.</u> Claim 1 recitation should be read to refer to the above-discussed form of rotational asymmetry, and not to "the curvature in the main scanning direction on one side of the optical axis is not the same as that on the other side of the optical axis, and the curvature in the sub-scanning direction on one side of the optical axis is not the same as that on the other side of the optical axis". And the <u>Takada, et al.</u> Claim 1 recitation having been so construed, Applicant respectfully submits that interfering subject matter exists and declaration of an interference would be appropriate. 37 C.F.R. § 41.203(a).

Separate and individual consideration of each dependent claim is respectfully requested.

REQUEST FOR INTERVIEW

Applicant respectfully requests that the Examiner contact Applicant's undersigned representative to schedule a personal interview to discuss the proposed interference.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our address listed below.

Respectfully submitted,

/Daniel S. Glueck/
Daniel S. Glueck
Attorney for Applicant
Registration No. 37,838

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3800
Facsimile: (212) 218-2200
DSG\cmg

DC_MAIN 252536v1

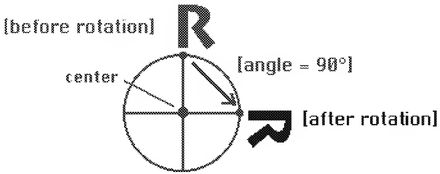
The Four Types of Symmetry in the Plane

written by Dr. Susan Addington
California Math Show
susan@math.csusb.edu
http://www.math.csusb.edu/
formatted and edited by Suzanne Alejandre

A pattern is symmetric if there is at least one symmetry
(rotation, translation, reflection, glide reflection)
that leaves the pattern unchanged.

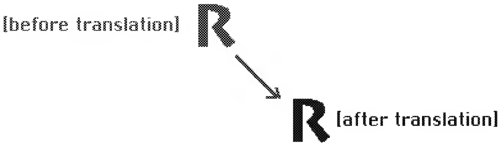
Rotation

To rotate an object means to turn it around. Every rotation has a center and an angle.



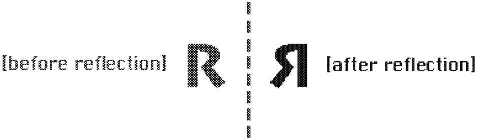
Translation

To translate an object means to move it without rotating or reflecting it. Every translation has a direction and a distance.



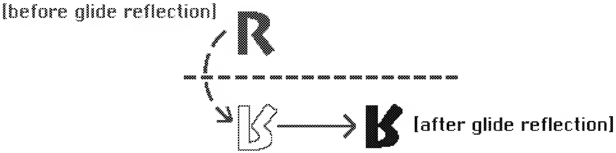
Reflection

To reflect an object means to produce its mirror image. Every reflection has a mirror line. A reflection of an "R" is a backwards "R".



Glide Reflection

A glide reflection combines a reflection with a translation along the direction of the mirror line. Glide reflections are the only type of symmetry that involve more than one step.



Symmetries create patterns that help us organize our world conceptually. Symmetric patterns occur in nature, and are invented by artists, craftspeople, musicians, choreographers, and mathematicians.

In mathematics, the idea of symmetry gives us a precise way to think about this subject. We will talk about plane symmetries, those that take place on a flat plane, but the ideas generalize to spatial symmetries too.

Plane symmetry involves moving all points around the plane so that their positions relative to each other remain the same, although their absolute positions may change. Symmetries preserve distances, angles, sizes, and shapes.

1. For example, rotation by 90 degrees about a fixed point is an example of a plane symmetry.

2. Another basic type of symmetry is a reflection. The reflection of a figure in the plane about a line moves its reflected image to where it would appear if you viewed it using a mirror placed on the line. Another way to make a reflection is to fold a piece of paper and trace the figure onto the other side of the fold.

3. A third type of symmetry is translation. Translating an object means moving it without rotating or reflecting it. You can describe a translation by stating how far it moves an object, and in what direction.

4. The fourth (and last) type of symmetry is a glide reflection. A glide reflection combines a reflection with a translation along the direction of the mirror line.

A figure, picture, or pattern is said to be symmetric if there is at least one symmetry that leaves the figure unchanged. For example, the letters in

ATOYOTA

form a symmetric pattern: if you draw a vertical line through the center of the "Y" and then reflect the entire phrase across the line, the left side becomes the right side and vice versa. The picture doesn't change.

If you draw the figure of a person walking and copy it to make a line of walkers going infinitely in both directions, you have made a symmetric pattern. You can translate the whole group ahead one person, and the procession will look the same. This pattern has an infinite number of symmetries, since you can translate forward by one person, two people, or three people, or backwards by the same numbers, or even by no people. There is one symmetry of this pattern for each integer (positive, negative, and zero whole numbers).

Problems

1. Classify all the capital letters in English (in their simplest forms) according to their symmetries. For example, "A" has a reflection in a vertical line, and "R" has no symmetry (except rotation by 0 degrees).

2. Make a symmetric pattern by starting with an asymmetric shape (a letter is fine) and repeating a single translation over and over (also translate it backwards). That is, decide on a direction and distance for your translation (for example, 5 cm to the right). Translate your letter 5 cm to the right, then translate the new letter 5 cm to the right, etc. Also translate the original letter 5 cm. to the left, etc. Did you get any other types of symmetries (reflections, glide reflections, or rotations) in the process?

3. Make a symmetric pattern by starting with an asymmetric shape and repeating a single glide reflection over and over (also glide it backwards). That is, pick a reflection line and a translation in a direction parallel to the reflection line. Keep applying the same glide reflection to the new shapes that you generate until you run out of paper. Did you get any other types of symmetries (reflections, translations, or rotations) in the process?

4. On a piece of paper, draw a letter R (call it R1) and two parallel lines about an inch apart. Call the lines L1 and L2. Reflect the R across the first line, L1, and call it R2. Reflect R2 across the line L2 and call it R3.

   a. How is R3 related to R1? (by which type of symmetry?)

   b. Continue your pattern by reflecting the new Rs across L1 and L2. Keep going until you run out of paper or until you don't get anything new. Would this be an infinite pattern if you had an infinitely large piece of paper?

   c. What symmetries does your pattern have besides reflections across L1 and L2?

5. Repeat the previous activity using lines that are not parallel but intersect at a 45-degree angle.

   a. Now how is R3 related to R1?

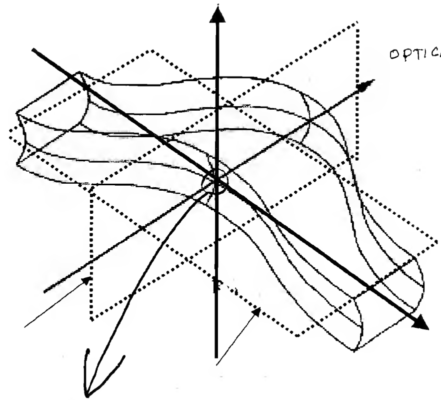
   b. Continue your pattern by reflecting the new Rs across L1 and L2. Keep going until you run out of paper or until you don't get anything new. Would this be an infinite pattern if you had an infinitely large piece of paper?

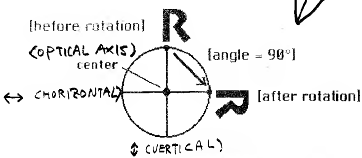
   c.What symmetries does your pattern have besides reflections across L1

and L2?

6. Remember making strings of paper dolls or snowflakes by cutting a strip of folded paper? Adapt one of these activities so that it explicitly talks about symmetries. Invent some questions about it appropriate for children.

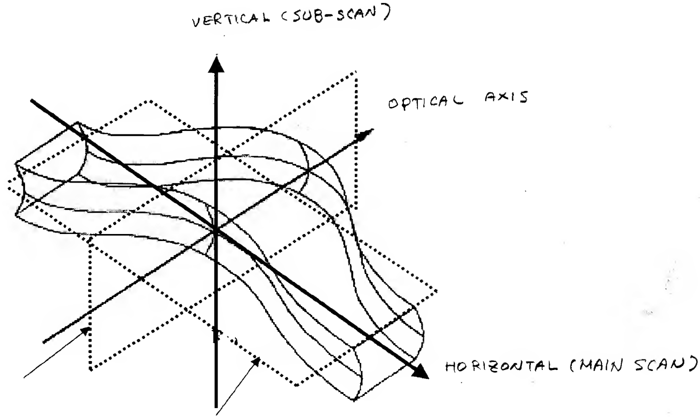
7. *(Extension)* Consider patterns generated by reflections across two intersecting lines, but use other angles. For example, what if the lines formed an angle of 111 degrees, or 60 degrees? If you can, find a general pattern that will predict results for any angle.



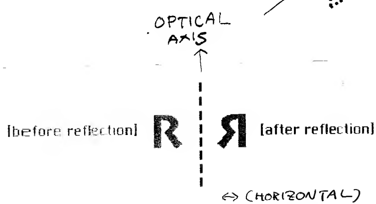


SKETCH "A"

CFE3135US



SKETCH "B"



CFE3135US